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# **100 Series Media Converter & Industrial Ethernet Switches**

## **User Manual & Installation Guide**

## Industrial Media Converter Installation Guide

**102MC-XX**

**102MCE-XX-YY**

**104TX**

**105TX**

**108TX**

Where: XX = ST or SC and YY = -15, -40, or -80



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## **GENERAL SAFETY WARNINGS**

**WARNING:** Do not operate the equipment in the presence of flammable gasses or fumes. Operating electrical equipment in such an environment constitutes a definite safety hazard.

**WARNING:** If the equipment is used in the manner not specified by N-TRON Corp., the protection provided by the equipment may be impaired.

**WARNING:** Do not perform any services on the unit unless qualified to do so. Do not substitute unauthorized parts or make unauthorized modifications to the unit.

**WARNING:** Do not operate the unit with the end plates removed, as this could create a shock or fire hazard.

**WARNING:** Do not operate the equipment in a manner not specified by this manual.

## **ENVIRONMENTAL SAFETY WARNINGS**



**WARNING:** Disconnect the power and allow to cool 5 minutes before touching.

## **ELECTRICAL SAFETY WARNINGS**



**WARNING:** Disconnect the power cable before removing the end plates.

**WARNING:** Do not operate the unit with the end plates removed.

**WARNING:** Do not work on equipment or cables during periods of lightning activity.

**WARNING:** Do not perform any services on the unit unless qualified to do so.

**WARNING:** Observe proper DC Voltage polarity when installing power input cables. Reversing voltage polarity can cause permanent damage to the unit and void the warranty.

## **HAZARDOUS LOCATION INSTALLATION REQUIREMENTS**

1. This equipment is suitable for use in Class I, Div 2, Groups A, B, C, and D, or unclassified or non-hazardous locations.
2. **WARNING:** Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2.
3. **WARNING:** Explosion hazard, do not disconnect while the circuit is live or unless the area is known to be non-hazardous.
4. **WARNING:** Explosion Hazard - Do not remove or replace the device unless power has been switched off or the area is known to be non-hazardous.
5. Use 60/75°C rated Copper wire, (022Nm) 2 inch-lbs Tightening torque for field installed connectors.
6. **WARNING:** Install only in accordance with Local & National Codes of Authorities Having Jurisdiction.
7. Class I, Div 2 Installations require that power connections must be current limited at the power source with an in-line fuse rated at 0.5A.
8. Class I, Div 2 installations require that all devices connected to this product must be UL listed for the area in which it is installed.
9. Limited Operating Voltage: 12-30V for Class I, Div 2 installations.

## **100 Series Industrial Ethernet Switches**

The 100 Series Unmanaged Industrial Ethernet Switches support high speed layer 2 switching between ports. This series of switches are housed in a ruggedized aluminum enclosure, and provide Category-5 compliant 10/100-BaseT connections for high performance network design, and hub/repeater upgrades.

The 102MC/MCE is a two port unmanaged media converter that converts 10/100BaseTX copper to 100BaseFX full duplex fiber.

The 104TX, 105TX, and 108TX are affordable and share a small footprint. Each switch is capable of auto negotiating 10/100 Mb and half/full duplex communications.

The 102MC utilizes the IEEE compliant SC or ST duplex connectors for fiber optic communication. All 10/100Base-TX ports utilize the RJ45 shielded connectors.

### **Key Features**

- Full IEEE 802.3 & 100Base-FX Compliance
- Extended Environmental Specifications
- Support for Full/Half Duplex Operation
- LED Link/Activity Status Indication
- Autonegotiation, Autosensing Speed, Duplex, and Flow Control
- Up to 1.0 Gb/s Maximum Throughput
- Industry Standard 35mm DIN Rail Mounted Enclosure



## **PACKAGE CONTENTS**

Please make sure the Serial over Ethernet package contains the following items:

1. 100 Series Media Converter or Ethernet Switch
2. Instruction Sheet

Contact your carrier if any items are damaged.

## **UNPACKING**

Remove all the equipment from the packaging, and store the packaging in a safe place. File any damage claims with the carrier.

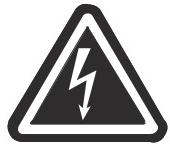
## **CLEANING**

**Clean only with a damp cloth.**

## **INSTALLATION**

**Read the following warning before beginning the installation:**

## **WARNING**



Never install or work on electrical equipment or cabling during periods of lightning activity. Never connect or disconnect power when hazardous gasses are present.

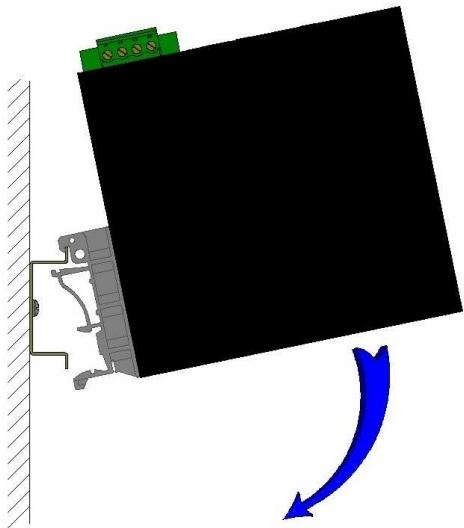
## **LASER SAFETY (FXE -40 and -80 Only)**



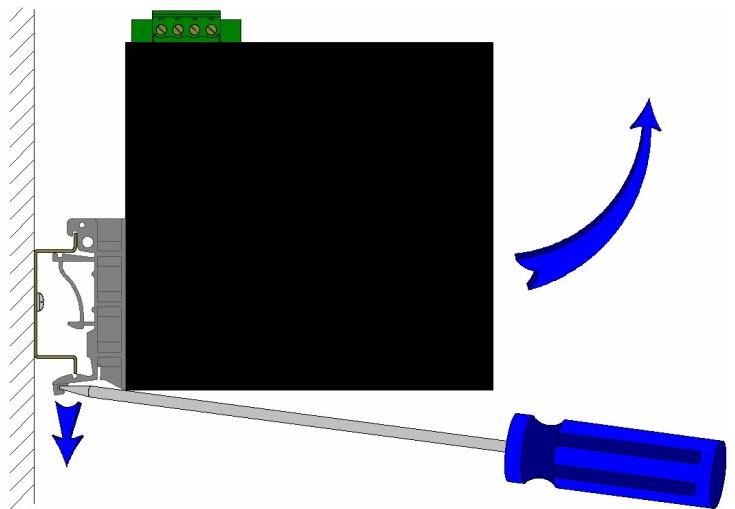
**WARNING: CLASS 1 LASER PRODUCT.** Do not stare into the laser.

## DIN-Rail Mounting

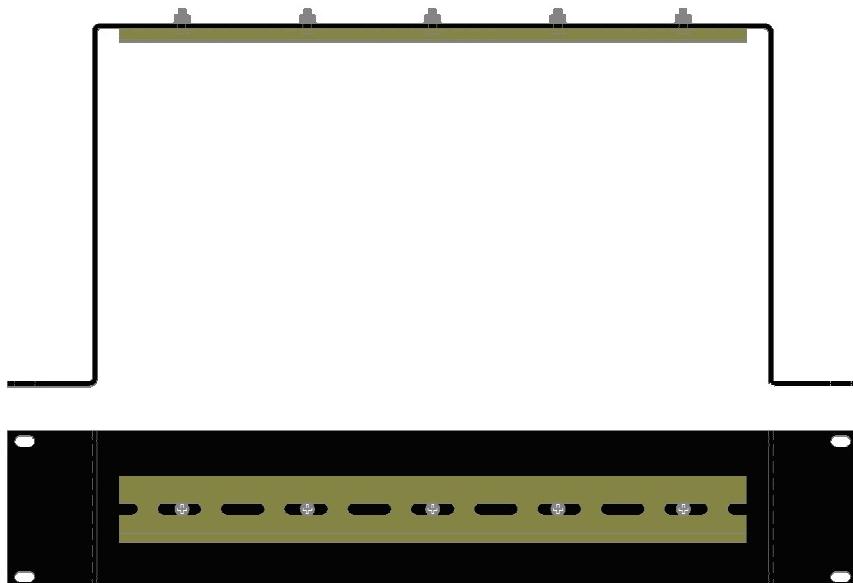
Install the unit in a standard DIN rail. Recess the unit to allow at least 2" of horizontal clearance for CAT5e cable bend radius.



To install the unit to 35mm industrial DIN rail, place the top edge of the included mounting bracket on the back of the unit against the DIN rail at a 15° angle as shown. Rotate the bottom of the unit to the back (away from you) until it snaps into place.

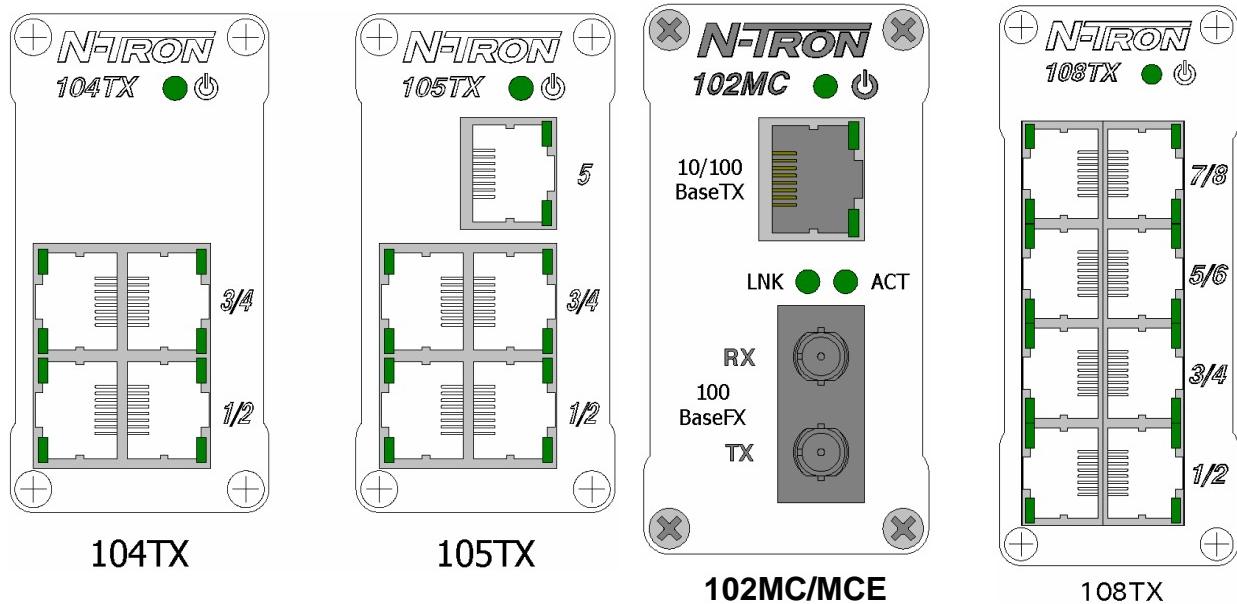


To remove the unit from the 35mm industrial DIN rail, place a flat head screwdriver into the release clip found at the bottom of the unit, and apply downward force on the clip until it disengages from the bottom of the unit from the DIN rail. Rotate the bottom of the unit towards you and up at an approximate 15° upward angle to completely remove the unit.



Most N-Tron™ products are designed to be mounted on industry standard 35mm DIN rail. However, DIN rail mounting may not be suitable for all applications. Our Rack Mount Assembly (P/N: 900-RM) may be used to mount the 102MC enclosures to standard 19" racks as an option.

## FRONT PANEL



**From Top to Bottom:**

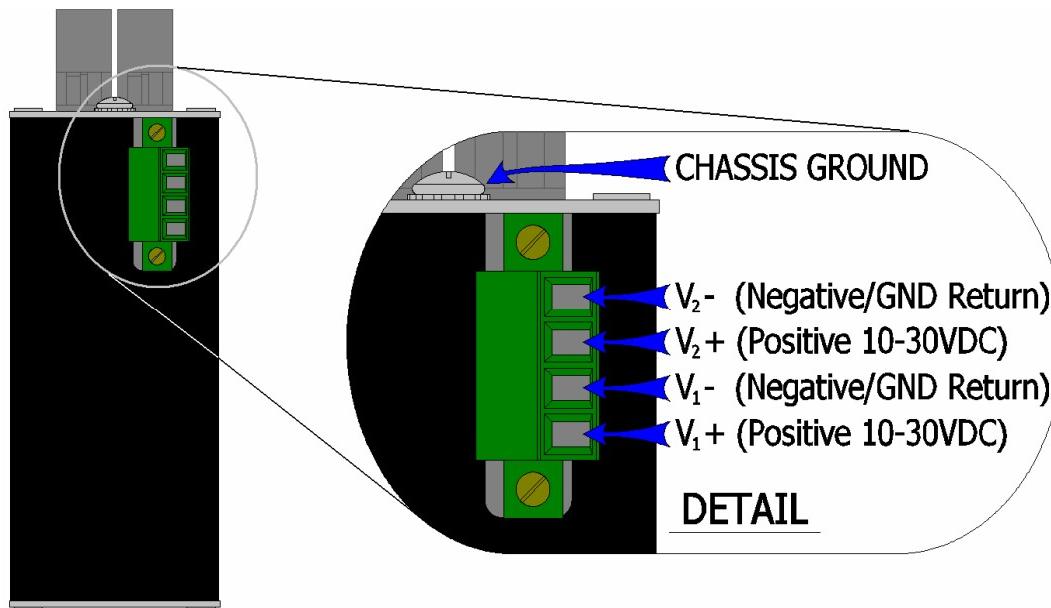
<b>SPD</b>	Speed LED
<b>LNK/ACT</b>	Link/Activity LED
<b>RJ45 Ports</b>	Auto sensing 10/100BaseT Connection
	Green LED lights when Power is connected

**NOTE:** The RJ45 data port has two LED's located at the left side of the connector. The top LED indicates Activity (ACT), and the lower LED indicates Link (LNK) status.

**LED's:** The table below describes the operating modes:

LED	Color	Description
	ON	Power is Applied.
	OFF	Power is OFF.
<b>LNK/ACT</b>	ON	Link established, no Activity on cable.
	BLINKING	Link established, Activity on cable
	OFF	No link activity on cable.
<b>SPD</b>	ON	LINK is 100Mbps.
	OFF	Link is 10Mbs.

## APPLYING POWER (Top View)



Unscrew & Remove the DC Voltage Input Plug from the top header.  
Install the DC Power Cables into the Plug (observing polarity on unit).  
Plug the Voltage Input Plug back into the top header.  
Tightening torque for the terminal block power plug is **0.22 Nm/0.162 Pound Foot**.  
All LED's will flash ON Momentarily.  
Verify the Power LED stays ON (GREEN).

**Note:** Either V<sub>1</sub> or V<sub>2</sub> can be connected to power for minimal operation. For redundant power operation, V<sub>1</sub> and V<sub>2</sub> plugs must be connected to separate DC Voltage sources. Use wire sizes of 16-28 gauge. The power cord should be limited to less than 10 meters in order to ensure optimum performance.

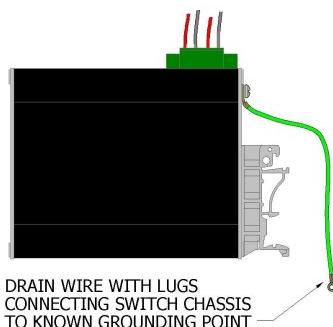
Recommended 24V DC Power Supplies, similar to:

100-240VAC:

N-Tron NTPS-24-1.3, DC 24V/1.3A

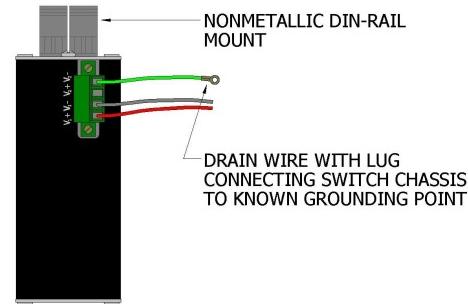
## N-TRON SWITCH GROUNDING TECHNIQUES FOR 100 SERIES

The grounding philosophy of any control system is an integral part of the design. N-Tron switches are designed to be grounded, but the user has been given the flexibility to float the switch when required. The best noise immunity and emissions (i.e. CE) are obtained when the N-Tron switch chassis is connected to earth ground via a drain wire. Some N-Tron switches have metal din-rail brackets that can ground the switch if the din-rail is grounded. In some cases, N-Tron switches with metal brackets can be supplied with optional plastic brackets if isolation is required.



Users may run a drain wire & lug from the screw provided on the back face of the enclosure. In the event the provided grounding screw has been lost, care should be taken to limit the penetration of the outer skin by less than 1/4". Failure to do so may cause irreversible damage to the internal components of the switch.

Note: Ensure the power supply is grounded properly before applying power to the grounded switch. This may be verified by using a voltmeter to determine that there is no voltage difference between the power supply's negative output terminal and the chassis grounding point of the switch.



As an alternative grounding method, both V- legs of the power input connector are connected to chassis internally on the PCB. Connecting a drain wire to earth ground from one of the V- terminal plugs as shown here will ground the switch and the chassis. The power leads from the power source should be limited to 3 meters or less in length.

The use of shielded cables between devices is not required for most N-Tron devices (please consult the user manuals for specific details). If the use of shielded cables is required, it is generally recommended to only connect the shield at one end to prevent ground loops and interfere with low level signals (i.e. thermocouples, RTD, etc.). Cat5e cables manufactured to EIA-568A or 568B specifications are required for use with N-Tron Switches.



In the event all Cat5e patch cable distances are small (i.e. All Ethernet devices are located the same local cabinet and/or referenced to the same earth ground), it is permissible to use fully shielded cables terminated to chassis ground at both ends in systems void of low level analog signals.

## **CONNECTING THE UNIT**

For the 100BaseFX Fiber Optic port, remove the dust cap(s) from the fiber optic connector and connect the fiber optic cables. The TX port on the local unit should be connected to the RX port of the far end device, and the RX port should be connected to the TX port of the far end device.

For 10Base-T ports, plug a Category 3 (or greater) twisted pair cable into the RJ45 connector. For 100Base-T ports, plug a Category 5 (or greater) twisted pair cable into the RJ45 connector. Connect the other end to the far end station. Verify that the LNK LED's are ON once the connection has been completed. To connect any other port to another Switch or Repeater, use a standard Cat5 straight through or crossover cable.

## **TROUBLESHOOTING**

1. Make sure the  (Power LED) is ON.
2. Make sure you are supplying sufficient current for the version chosen. Note: The Inrush current will exceed the steady state current by ~ 2X.
3. Verify that Link LED's are ON for both ports.
4. Verify cabling used between stations.
5. Verify that cabling is Category 3 or greater for 10Mbit Operation.

## **SUPPORT**

Contact N-TRON Corp. at:

TEL: 251-342-2164

FAX: 251-342-6353

[www.n-tron.com](http://www.n-tron.com)

[support@n-tron.com](mailto:support@n-tron.com)

## **FCC STATEMENT**

This product complies with Part 15 of the FCC-A Rules.

Operation is subject to the following conditions:

- (1) This device may not cause harmful Interference
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## **INDUSTRY CANADA**

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions; (1) this device digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions; (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareillage numérique de la classe A répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

**Regulatory Approvals:**

**Safety:** UL Listed per ANSI/ISA-12.12.01-2000 (US and Canada)

This apparatus is suitable for use in Class I, Div 2, Groups A, B, C, and D

**UL Temperature Ratings:** 102MC/MCE - T5

104TX, 105TX, and 108TX - T4A

**EMI:** EN61000-6-4, EN55011 - Class A

FCC Title 47, Part 15, Subpart B - Class A

ICES-003 – Class A

**EMS:** EN61000-6-2

EN61000-4-2 (ESD)

EN61000-4-3 (RS)

EN61000-4-4 (EFT)

EN61000-4-5 (Surge)

EN61000-4-6 (Conducted Disturbances)

**Warranty:** 1 year from the date of purchase.

## **102MC/MCE - KEY SPECIFICATIONS**

### **Physical**

*Height:* 2.90" (max.)  
*Width:* 1.50" (max.)  
*Depth Including Din-Rail Clip:* 4.82" (max.)  
*Weight:* 0.60 lbs.

### **Electrical**

*Input Voltage:* 10-30 VDC (Regulated)  
*Input Current:* 1 40mA max. @ 24VDC (Steady State)  
*Inrush Current:* 8.5Amp/0.7 ms max. @ 24VDC  
*Input Ripple:* Less than 100 mV  
*Input Wire Size:* 16-28 AWG

### **Environmental**

*Operating Temperature:* -40°C to 80°C  
*Storage Temperature:* -40°C to 85°C  
*Operating Humidity:* 10% to 90% (Non Condensing)  
*Operating Altitude:* 0 to 10,000 ft.

### **Network Media**

*10BaseT:* > Cat-3 Cable  
*100BaseT:* > Cat-5 Cable  
*100BaseFX:* Multimode: 50-62.5/125µm Fiber  
Singlemode: 7-9/125µm Fiber

### **Fiber Transceiver Characteristics**

Fiber Length:	2km*	15km**	40km**	80km**
TX Power Min/Max	-19dBm/-14dBm	-15dBm/-7dBm	5dBm/0dBm	-5dBm/0dBm
RX Sensitivity Max:	-32dBm	-34dBm	-34dBm	-34dBm
Wavelength:	1310nm	1310nm	1310nm	1550nm

\*=Multimode \*\*=Singlemode

### **Connectors**

10/100BaseTX: RJ45 UTP Port  
100BaseFX: SC or ST Duplex Port

### **Recommended Minimum Wiring Clearance:**

*Front:* 5" (12.7 cm)  
*Top:* 1" (2.54 cm)

## **104TX/105TX - KEY SPECIFICATIONS**

### **Physical**

*Height:* 2.9" (max.)  
*Width:* 1.50" (max.)  
*Depth:* 4.25" (max.)  
*Weight:* 0.60 lbs.

### **Electrical**

*Input Voltage:* 10-30 VDC (Regulated)  
*Input Current:* 215 mA max. @ 24VDC (Steady State)  
*Inrush Current:* 7.8 Amp/0.7ms max. @ 24VDC  
*Input Ripple:* Less than 100 mV  
*Input Wire Size:* 16-28 AWG

### **Environmental**

*Operating Temperature:* -40°C to 80°C  
*Storage Temperature:* -40°C to 85°C  
*Operating Humidity:* 10% to 90% (Non Condensing)  
*Operating Altitude:* 0 to 10,000 ft.

### **Network Media**

*10BaseT:* > Cat-3 Cable  
*100BaseT:* > Cat-5 Cable

### **Connectors**

10/100BaseT: RJ45 UTP Ports

### **Recommended Minimum Wiring Clearance:**

*Top:* 2" (5.08 cm)  
*Front:* 2" (5.08 cm)  
*Side:* 1" (2.54 cm)

**Warranty:** 1 year from the date of purchase.

## **108TX - KEY SPECIFICATIONS**

### **Physical**

<i>Height:</i>	3.5" (8.89 cm)
<i>Width:</i>	1.50" (3.81 cm)
<i>Depth Including DIN Rail Clip:</i>	4.22" (10.7 cm)
<i>Weight:</i>	0.64 lbs. (0.29 kg)
<i>DIN Rail</i>	35 mm

### **Electrical**

<i>Input Voltage:</i>	10-30 VDC (Regulated)
<i>Input Current:</i>	250 mA max. @ 24VDC (Steady State)
<i>Inrush Current:</i>	8.1 Amp/0.7ms max. @ 24VDC
<i>Input Ripple:</i>	Less than 100 mV
<i>Input Wire Size:</i>	16-28 AWG

### **Environmental**

<i>Operating Temperature:</i>	-40°C to 70°C
<i>Storage Temperature:</i>	-40°C to 85°C
<i>Operating Humidity:</i>	10% to 90% (Non Condensing)
<i>Operating Altitude:</i>	0 to 10,000 ft.

### **Network Media**

<i>10BaseT:</i>	> Cat-3 Cable
<i>100BaseT:</i>	> Cat-5 Cable

### **Connectors**

10/100BaseT: Eight (8) RJ45 UTP Ports

### **Recommended Minimum Wiring Clearance:**

*Top:* 2" (5.08 cm)

*Front:* 2" (5.08 cm)

## N-TRON Limited Warranty

N-TRON, Corp. warrants to the end user that this hardware product will be free from defects in workmanship and materials, under normal use and service, for the applicable warranty period from the date of purchase from N-TRON or its authorized reseller. If a product does not operate as warranted during the applicable warranty period, N-TRON shall, at its option and expense, repair the defective product or part, deliver to customer an equivalent product or part to replace the defective item, or refund to customer the purchase price paid for the defective product. All products that are replaced will become the property of N-TRON. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer. N-TRON shall not be responsible for any custom software or firmware, configuration information, or memory data of customer contained in, stored on, or integrated with any products returned to N-TRON pursuant to any warranty.

**OBTAINING WARRANTY SERVICE:** Customer must contact N-TRON within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase from N-TRON or its authorized reseller may be required. Products returned to N-TRON must be pre-authorized by N-TRON with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment. Responsibility for loss or damage does not transfer to N-TRON until the returned item is received by N-TRON. The repaired or replaced item will be shipped to the customer, at N-TRON's expense, not later than thirty (30) days after N-TRON receives the product. N-TRON shall not be responsible for any software, firmware, information, or memory data of customer contained in, stored on, or integrated with any products returned to N-TRON for repair, whether under warranty or not.

**ADVANCE REPLACEMENT OPTION:** Upon registration, this product qualifies for advance replacement. A replacement product will be shipped within three (3) days after verification by N-TRON that the product is considered defective. The shipment of advance replacement products is subject to local legal requirements and may not be available in all locations. When an advance replacement is provided and customer fails to return the original product to N-TRON within fifteen (15) days after shipment of the replacement, N-TRON will charge customer for the replacement product, at list price.

**WARRANTIES EXCLUSIVE:** IF AN N-TRON PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT N-TRON'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, CORRESPONDENCE WITH DESCRIPTION, AND NON-INFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. N-TRON NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS. N-TRON SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT OR MALFUNCTION IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO OPEN, REPAIR OR MODIFY THE PRODUCT, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, POWER CUTS OR OUTAGES, OTHER HAZARDS, OR ACTS OF GOD.

**LIMITATION OF LIABILITY:** TO THE FULL EXTENT ALLOWED BY LAW, N-TRON ALSO EXCLUDES FOR ITSELF AND ITS SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF N-TRON OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT N-TRON'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

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**GOVERNING LAW:** This Limited Warranty shall be governed by the laws of the State of Alabama, U.S.A.